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China's Export Growth and the China Safeguard

Threats to the World Trading System?

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Abstract

Is there evidence from China's pre-WTO accession period that newly imposed U.S. or EU import restrictions deflect Chinese exports to third markets? The authors examine this question by drawing on a newly constructed data set of U.S. and EU product-level import restrictions on Chinese trade imposed between 1992 and 2001 and estimate their impact on Chinese exports to 38 alternative markets. There is no systematic evidence that the import restrictions imposed during this period resulted in Chinese exports surging to such alternate destinations. To the contrary, there is weak evidence of a chilling effect on China's exports to third markets.

This paper—a product of the Trade and Integration Team, Development Research Group—is part of a larger effort in the department to evaluate the impact that international institutions have on the market access. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at cbown@worldbank.org.

China's Export Growth and the China Safeguard: Threats to the World Trading System?[†,‡]

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1 Introduction

China's entry into global markets has had an important effect on the rules of the world trading system. After close to fifteen years of negotiations that began under the General Agreement on Tariffs and Trade (GATT), China was finally granted membership in the World Trade Organization (WTO) in 2001. While China's accession to the organization was heralded as a significant achievement for trade policy negotiators, its terms of accession introduced new allowances for existing members to deviate from historic and core GATT/WTO principles. In particular, the commitment that members adhere to the fundamental rules of *reciprocity* and *most-favored nation* (MFN) treatment, the second of which is also referred to as *nondiscriminatory* treatment across trading partners, was substantially weakened through the introduction of a newly available "China safeguard" import-restricting policy instrument. A political justification for the new safeguard was that China's export capacity threatened to disrupt established trade patterns. Furthermore, an unprecedented statutory trigger for use of the import restriction is the phenomenon of "trade deflection," i.e., where a different country's imports from China surge *because of* a first country imposing its own trade restriction that shut Chinese exports out of its market.

This paper empirically investigates whether there is historical evidence that the imposition of discriminatory import restrictions on Chinese trade *deflected* Chinese exports to third markets during its pre-accession period. Since the discriminatory China safeguard was not in use during this period, we address the question by matching data on Chinese exports to 38 destination markets to a new dataset of discriminatory antidumping measures imposed on China by two of its most important trading partners. To the best of our knowledge, this is the first paper to investigate whether Chinese exports have been deflected to alternative markets when hit with discriminatory trade restrictions. Prior research investigating related questions has found evidence of such trade deflection; nevertheless, the prior evidence has not investigated Chinese exports, as it has been limited to the examination of exports from other countries and/or is focused on specific industries.[1]

WTO members created a "Transitional Product-Specific Safeguard Mechanism" that can be used against imports from China until 2014 under Section 16 of China's terms of accession (WTO, 2001). Many characteristics of the new China safeguard are at odds with core WTO principles and estab-

[1] In work motivated by the EU's 2002 global safeguard policy on steel which invoked a similar concern over trade deflection emanating from the U.S. steel safeguard (EU, 2002), Bown and Crowley (2007) find substantial evidence that the imposition of administered import-restricting trade policies against Japanese exports led to export surges to alternative markets. Durling and Prusa's (2006) investigation of global exports from the hot rolled steel market provides some evidence for trade deflection, as does Debaere's (forthcoming) investigation of the shrimp market in response to the EU's discriminatory revocation of GSP status for Thai exporters.

lished instruments of administered import protection traditionally available to its Members.[2] First, unlike any other import-restricting policy instrument legally available to the WTO membership, the allowance of a China-*specific* trade restriction on imports of *fairly* traded goods is otherwise inconsistent with MFN treatment.[3] Second, the use of the new China safeguard also does not require the policy-imposing country to immediately compensate China for withdrawing trade concessions. This, in effect, weakens the commitment to the WTO's *reciprocity* principle as well.[4]

The most radical change introduced by the new China safeguard is the weakened evidentiary criterion that WTO members must satisfy in order to legally impose a new barrier to Chinese trade. Specifically, section 16.8 of China's accession introduced the following,

> "If a WTO Member considers that an action [i.e., a China safeguard imposed by another Member]... causes or threatens to cause significant diversions of trade into its market [i.e., 'trade deflection'], it may request consultations with China and/or the WTO Member concerned... If such consultations fail to lead to an agreement... the requesting WTO Member shall be free, in respect of such product, to withdraw concessions accorded to or otherwise limit imports from China..." (WTO, 2001, p. 10).

The implication of section 16.8 is that, if one WTO member imposes a China safeguard, a second WTO member can automatically impose a China safeguard on the same product without having to undertake its own injury investigation. Thus the second country can impose a China safeguard on the same product without having to demonstrate actual evidence of a threat of deflected imports from China, evidence of an actual increase in imports from China, or even evidence of injury (or a threat of

[2]Some of the discriminatory elements of the China safeguard are reminiscent Japan's 1955 entry into the GATT. In particular, a 1987 GATT working party pointed out that, despite the desire at the time for some existing members to introduce a new Japan-specific safeguard, "Japan became a contracting party in September 1955 without any new general safeguard clause being added to the General Agreement. Some [13 out of 34] contracting parties invoked Article XXXV ["Non-Application of the Agreement between Specific Contracting Parties"] on Japan's accession. In a number of cases, Japan negotiated bilateral trade agreements containing special safeguard clauses which were followed by the countries concerned disinvoking Article XXXV." (GATT 1987, p. 2) For an additional discussion of the China safeguard, see Messerlin (2004).

[3]There are three other primary areas under the WTO in which exceptions to MFN-treatment for import restrictions are broadly permissible: 1) raising discriminatory trade barriers against *unfairly* traded goods under antidumping or countervailing duty laws; 2) lowering trade barriers in a discriminatory manner under a reciprocal preferential trade agreement; and 3) lowering trade barriers in a discriminatory manner to developing countries unilaterally, such as under the Generalized System of Preferences (GSP).

[4]Bagwell and Staiger (1999) provide an economic interpretation of reciprocity under the GATT/WTO, noting that it is primarily a rule for *renegotiations* that limits a WTO trading partner's permissible compensatory retaliation when a first country seeks to *raise* its tariff above a previously agreed-upon level, as would be the case here.

injury) to its own domestic industry. This is a substantial difference from all other WTO-authorized import restrictions, which require some evidence and impose a nontrivial resource and political cost on a country seeking to limit the market access previously granted to another WTO member.[5] This policy is based on the now codified provision that there *exists* a substantial threat that one country's China safeguard will deflect Chinese exports to a third market.

Thus far, the most public battles over use of the new China safeguard focused on the U.S. imposing a new 35% tariff on imported Chinese tires in September 2009, and the U.S. and EU using its auspices to negotiate Chinese voluntary export restraints on fairly traded imports of textile and clothing products in 2005. Nevertheless, data collected from the WTO and reported in Bown (2010a) indicate that at least ten different WTO members initiated investigations under the new China-safeguard policy between 2002 and 2009, with at least six of those countries imposing new trade barriers on products as varied as float glass, polyvinyl chloride, and porcelain tiles (Turkey); tires (U.S.); soda ash and aluminum (India); as well as textiles and clothing products (U.S., EU, Peru and Colombia).[6] In the midst of the global financial crisis in 2009, India alone initiated five different investigations under its China-safeguard policy. And an examination of countries with relatively transparent import policy governance such as Canada (CITT, 2007) and the U.S. (ITC, 2007) indicates that WTO members were quick to include the "trade deflection" provision into their domestic implementing legislation thus making it readily accessible for competing industries and policymakers seeking a new trigger to limit Chinese exports.[7]

Is there historical evidence that discriminatory trade restrictions imposed on China have disrupted

[5] The standard safeguard investigation requires evidence of injury (or threat thereof) caused by increased imports. Antidumping (countervailing duty) investigations also require evidence of less than fair value pricing (illegal export subsidies) in addition to the evidence of injury caused by imports. For a discussion of the general role of safeguards in the WTO, see Hoekman and Kostecki (2009).

[6] Bown (2010b) provides a more detailed discussion of China-specific safeguard use between 2002 and 2006, including the 2005 voluntary export restraints that the U.S. and EU negotiated over Chinese textile and apparel. The ten economies that reported to the WTO that they initiated investigations between 2002 and 2009 are Canada; Colombia; Ecuador; EU; India; Peru; Poland; Taiwan, China; Turkey; and the U.S. Note that the number of initiated investigations in the data is a lower bound due to lax WTO notification requirements - i.e., because Article 16 of China's WTO Accession Protocol does not require members to notify the WTO of the initiation of investigations, some investigations that did not result in new trade barriers (which must be notified to the WTO) may not have been reported. Furthermore, as stipulated under paragraph 241 of the Working Party Report on the Accession of China (WTO document WT/MIN(01)/3), the separate China-specific *textile* safeguard instrument available to WTO members until 2008 had no notification obligation whatsoever. This explains why the U.S. and EU China-specific textile safeguard cases in 2005 were not reported to the WTO and are not included in Bown (2010a).

[7] For the U.S., see 'Section 422: China Trade Diversion Investigations' of the U.S. Trade Act of 1974, and for Canada, see 'Safeguard Inquiry: Trade Diversion Imports from China' of the Canadian International Trade Tribunal Act.

trade flows via trade deflection? To investigate this question we examine the impact of discriminatory trade policies on Chinese product-level exports over its pre-accession 1992-2001 period. We focus on U.S. and EU imposition of product-specific, discriminatory import restrictions.[8] As table 1 indicates, one motivation for focusing on the U.S. and EU is that they are two of China's four largest destination markets for its exports. If China's exporters are able to deflect trade, these are two of the markets from which we expect trade deflection to derive.[9] Moreover, our focus on the effect of U.S. and EU discriminatory trade policies is motivated by data requirements. Both the U.S. and EU utilize discriminatory, antidumping import restrictions and publish very detailed, product-level information on these policies. Using newly collected data on policy impositions at the product level (Bown, 2010a) allows us to directly identify evidence of trade deflection associated with such measures.[10]

Figure 1 provides a second motivation by illustrating the likely phenomenon of "trade destruction" - i.e., the reduction of U.S. and EU imports and import growth in Chinese products that these economies have targeted with new antidumping trade barriers. The figures plot the average growth for U.S. and EU imports from China for two different categories of products over the 1990-2001 period: those targeted by antidumping and those products not targeted. The time path of imports of products targeted with antidumping does provide anecdotal evidence of the necessary condition (trade destruction in the U.S. and EU markets) that we expect to observe before anticipating that Chinese exports may be deflected to third markets; the latter of which is our primary empirical question of interest.[11]

[8]In what follows below, for convenience we may refer to the EU as a "country" since it invokes a singular trade policy stance toward Union non-members such as China.

[9]Furthermore, we believe there are good reasons to be less interested in focusing on two other primary export markets for China - Hong Kong SAR, China and Japan - as the "triggers" for the trade deflection. While Hong Kong SAR, China was technically China's largest export market in 1997, much of China's exports sent there are never intended for consumption, but instead for processing and re-export to other markets (Feenstra and Hanson, 2004). Furthermore, while Japan is China's third largest export market and a potential additional country to investigate, Japan has rarely used antidumping historically.

[10]Since China was not a WTO member during the sample period under investigation, even the mere attempt to track other (non-U.S., non-EU) countries' imposition of new import restrictions against China at the product level is extremely difficult, given that such policies were neither restricted by the WTO nor were countries required to report to the WTO the trade policies imposed against China.

[11]One issue that we address formally in the econometric approach described below, and which is motivated by a comparison of figures 1a and 1b, is that EU antidumping may have a differential impact on exports than US antidumping. For example, EU import growth from China in products subject to antidumping on average fell less dramatically and more slowly than US imports of products subject to US antidumping. And while it is not shown in the figures (which use *indices* to plot average import growth trajectories), on the other hand, the *level* of "deflectable" (year t) product-level EU imports from China that would be subject to antidumping ($23 million) was higher than US imports ($19 million) on average.

Table 2 further documents that the U.S. and EU are useful countries on which to focus because their antidumping authorities frequently targeted Chinese exports with new, discriminatory import restrictions. Combined, China faced the most antidumping investigations and the most imposed measures over the 1992-2001 period, roughly twice as many as the next most-targeted exporter (Japan). And as the middle columns indicate, under both the U.S. and EU antidumping regimes, China was also a frequent *single* target of investigation, implying that it often faced the imposition of discriminatory antidumping measures that will be most similar to the WTO's new China safeguard.[12] Moreover, even in investigations that target multiple foreign countries exporting the same product, an importer can discriminate against China by imposing higher antidumping duties or more stringent price undertaking requirements than those that are imposed on non-Chinese exporters of the same product. The second-to-last column provides evidence that China faces higher-than-average antidumping measures as well.

Nevertheless, despite China being a frequent target of both countries, table 3 indicates surprisingly little overlap to the Chinese products that are targeted by *both* the U.S. and EU regimes. For example, of the 123 unique 6-digit Harmonized System (HS) products exported from China that faced antidumping measures in the U.S. and the EU during the 1990-2001 period, only *fourteen* of those HS products were targeted by *both* countries over that twelve year period. As table 4 indicates, most of these products are in the steel (metals) and chemicals industries, and it is even more rare that the impositions occur in the same (or even adjacent) years.

With respect to our econometric investigation and results, perhaps surprisingly, we find no systematic evidence that U.S. or EU antidumping restrictions deflected Chinese exports to third markets over the 1992-2001 period. We examine the potential impact of contemporaneous as well as lagged effects of such policies, and we employ two distinct econometric approaches. Not only is there no evidence of trade deflection to these markets, there is some weak evidence of a *reduction* in the relative growth of Chinese exports of these targeted products to third markets. One interpretation is that this evidence is consistent with a global "chilling effect" of U.S. and EU antidumping on Chinese exports to alternative markets: i.e., Chinese exporters may be learning that certain products are in politically sensitive sectors and choosing to slow down their export expansion in these products. The size of the

[12] An antidumping measure would be less discriminatory than a China safeguard if there were multiple exporters targeted in a multi-country investigation of the same product. Hansen and Prusa (1996) argue that this is likely to occur in the U.S. due to the incentive created by U.S. law for petitioning industries to seek to cumulate imports in injury investigations. Furthermore, note that we do not examine the impact of countervailing duties because the U.S. did not impose any countervailing measures against Chinese products over the 1992-2001 period (Bown, 2010a) due to a 1984 Department of Commerce decision (upheld by the 1986 *Georgetown Steel* case) not to consider anti-subsidy investigations of exports from non-market economies like China and the former Soviet Union.

estimated effect is substantial as the conditional mean U.S. antidumping duty on China of 125% is associated with a 20 percentage point reduction in the relative growth rate of China's exports.

Our empirical results indicate no historical evidence of import restrictions deflecting Chinese trade and disrupting established trading patterns. Ironically, it may not be China's export growth and ability to deflect trade that poses a threat to the world trading system. Rather, a threat to the WTO could be the China safeguard policy that has been designed in part to remedy (the historically non-existent for China) trade deflection, but which allows existing WTO members to easily deviate from the WTO's core principles of reciprocity and MFN treatment. A substantial theoretical literature examining the GATT/WTO, closely associated with the work of Bagwell and Staiger (2002),[13] identifies reciprocity and MFN as some of the weakest rules necessary for countries to rely on to negotiate an efficiency-enhancing trade agreement initially and to sustain the agreement over time in the face of political and economic shocks. From this perspective, our results raise the question of any political-economic benefit to inclusion of the trade deflection provision, when easy access to the new China safeguard generated by this provision imposes costs via risks to the sustainability of the WTO.

The rest of this paper proceeds as follows. Section 2 details our empirical approach and the related literature. Section 3 describes the data used in the estimation, and section 4 presents our results and basic robustness checks using a difference-in-difference estimation approach. In section 5 we provide a last sensitivity analysis using an alternative, instrumental variables estimation approach. Section 6 concludes.

2 Empirical Model and Estimation

2.1 The empirical investigation

Our empirical analysis is motivated by a three country theoretical model in Bown and Crowley (2007) which develops a number of predictions relating a change in one country's trade policy to changes in trade flows among other countries. The most novel predictions are termed "trade deflection" and "trade depression." When one country (A) imposes a country-specific tariff on imports from another country (B), the consequent rise in exports from the second country (B) to the third country (C) is

[13] While much of the initial work in this area is contained in Bagwell and Staiger (2002), other recent papers also examine the roles of MFN and reciprocity as they relate to issues surrounding the accession of a substantial trading partner. For example, the principles combine to form a first line of defense against 'bilateral opportunism,' or the value of a concession won by one country in an earlier negotiation being eroded due to the outcome of a subsequent set of negotiations to which it is not party (Bagwell and Staiger, 2005). Furthermore, the principles can also be combined to facilitate multilaterally efficient outcomes, even when trade policy negotiations occur bilaterally and sequentially (Bagwell and Staiger, 2004).

termed trade deflection. Trade depression refers to the reduction in the third country's (C's) exports to the second country (B) when the first country (A) imposes a country-specific tariff on imports from country B. While it will not be the focus of empirical investigation here, the model also predicts "trade destruction," i.e., that country A's import tariff against country B will result in a fall in A's imports from country B. Lastly, the model predicts "trade creation through import source diversion" or, more succinctly "trade diversion," i.e., that country A's imports from country C will rise (Viner, 1950).[14]

In this paper, we estimate an augmented gravity model of China's (country B's) product-level exports to 38 trading partners (countries C) which has been adapted to estimate the effects of U.S. and EU (countries A) imposition of product-level antidumping duties. For clarity of exposition, ignoring China's other trading partners, what effects on trade flows might we expect when the country imposing the tariff is the U.S. and the foreign countries are Japan (country C) and China (country B)? First, if the U.S. imposes a country-specific tariff against China in the form of an antidumping duty and imposes no tariff against Japan, we might expect *deflected* trade, an increase in Chinese exports to Japan. Second, if the U.S. imposes a country-specific tariff against Japan in the form of an antidumping duty, but not against China, we might expect that Chinese exports to Japan will fall, i.e., *depressed* trade. In this case, Japanese exports that are diverted away from the U.S. market by the tariff and sold domestically within Japan depress Japanese imports from China.

2.2 The empirical model

In light of the WTO rules on the China safeguard, our primary interest is identifying trade deflection, an increase in China's exports to some country i in response to a trade restriction imposed by another country such as the U.S. or EU. We begin with a basic gravity specification for China's exports to country i that incorporates trade policy changes introduced by the U.S. and EU on their own imports from China. Ultimately we utilize two different econometric approaches to estimating trade deflection. Each approach relies on a different source of variation in the data to obtain identification and, thus, speaks to the robustness of our results.

To begin, assume that China's exports to country i of a 6-digit HS product h in year t can be written as a standard gravity model,

[14] Prusa (1997, 2001) and Konings, Vandenbussche and Springael (2001) provide earlier investigations for the trade diversion impact of discriminatory antidumping use in the U.S. and EU markets, respectively.

$$
\begin{aligned}
x_{ciht} = a_{ih} + a_{ht} + a_{it} + a_{ct} + \sum_{j=t-2}^{t} \beta'_{1j}\tau^{US}_{c,ushj} + \sum_{j=t-2}^{t} \beta'_{2j}\tau^{EU}_{c,euhj} + \sum_{j=t-2}^{t} \beta'_{3j}\tau^{US}_{i,ushj} \\
+ \sum_{j=t-2}^{t} \beta'_{4j}\tau^{EU}_{i,euhj} + \sum_{j=t-2}^{t} \beta'_{5j}\tau^{i}_{c,ihj} + \epsilon_{ciht},
\end{aligned} \tag{1}
$$

where x_{ciht} denotes exports from China to country i of 6-digit HS product h in year t, a_{ih} is country i's time-invariant propensity to import good h (e.g., time-invariant trade barriers, transportation costs, distance, culture, etc.), a_{ht} is a time-varying cost or productivity shock to good h, a_{it} represents country i's time-varying aggregate variables (e.g., GDP, the exchange rate, aggregate demand for imports), and a_{ct} represents China's time-varying aggregate variables (e.g., GDP, the exchange rate, aggregate supply of exports). The τ's in equation (1) are the trade policy changes that might impact China's exports to country i. Their first subscript indicates the country against which the restrictive trade policy is imposed, the second subscript indicates the country imposing the trade restriction, the third subscript denotes the product h, and the fourth subscript denotes the year j. Specifically, we include: the U.S. import tariff on good h exported from China ($\tau^{US}_{c,ushj}$), the EU import tariff on good h exported from China ($\tau^{EU}_{c,euhj}$), the U.S. import tariff on good h exported from country i ($\tau^{US}_{i,ushj}$), the EU import tariff on good h exported from country i ($\tau^{EU}_{i,euhj}$), and country i's import tariff on good h exported from China ($\tau^{i}_{c,iht}$). Finally, it may be the case that the impact of a change in a tariff on trade flows to third markets occurs only after a time delay. Thus we allow for current trade flows to be affected by both the contemporaneous ($j = t$) imposition of a new trade restriction, as well as trade policy changes of up to two lags ($j = t-1, t-2$).

In equation (1), the coefficients β_{1j} (β_{2j}) and β_{3j} (β_{4j}) for $j = t-2, t-1, t$ identify trade deflection and trade depression associated with U.S. (EU) antidumping duties, respectively. If the imposition of a U.S. (EU) antidumping duty against China is associated with an increase in China's exports to a third market, we expect that β_{1j} (β_{2j}) will be greater than zero. Furthermore, estimates of β_{3j} (β_{4j}) that are less than zero indicate trade depression; i.e., the imposition of a U.S. (EU) antidumping duty against country i is associated with a decrease in China's exports to that third market.

The greatest econometric concerns in estimating trade deflection and trade depression in equation (1) are the potential endogeneity of the tariffs and the relationship between a change in a tariff and any underlying cost or productivity shock affecting a particular 6-digit HS good. With regard to the tariffs, it seems reasonable to assume that the U.S. and EU antidumping duties are set independently vis-à-vis China's exports to some third country i. Moreover, the correlation between U.S. and EU trade policy changes against China in our sample is a very low 0.0006 suggesting that the U.S. and EU only rarely, if ever, respond to a common cost or technology shock in China. Despite this evidence against the concern that trade policy is responding to a common Chinese technology shock at the 6-digit HS level, we still want to carefully control for product-level shocks so that our estimates of the coefficients β_{1j} through β_{4j} can be interpreted as treatment effects of the policy change.

2.3 Difference-in-difference model to estimate trade deflection

Our first approach identifies trade deflection by utilizing variation within a 6-digit HS product across two exporting countries. First, rewrite an analog to equation (1) in which the exporter, China, is replaced with a subscript d to denote a different exporting country with exporting characteristics (described below) similar to China. Then we take the time difference of (1) for China as well as the time difference of the analog equation for exporter d, and we difference those two equations. Under the assumption that importing country i's trade policy is constant over the time period under consideration,[15] we then have:

$$\begin{aligned}(\Delta x_{ciht} - \Delta x_{diht}) = \Delta a_{ct} - \Delta a_{dt} + \sum_{j=t-2}^{t} \beta'_{1j}(\Delta\tau^{US}_{c,ushj} - \Delta\tau^{US}_{d,ushj}) \\ + \sum_{j=t-2}^{t} \beta'_{2j}(\Delta\tau^{EU}_{c,euhj} - \Delta\tau^{EU}_{d,euhj}) + (\Delta\epsilon_{ciht} - \Delta\epsilon_{diht}).\end{aligned} \tag{2}$$

The variable Δx_{ciht} (Δx_{diht}) denotes the growth of Chinese (country d) exports of h to country i at time t where $\Delta x_{ciht} \equiv \frac{x_{ciht}-x_{ciht-1}}{(x_{ciht}+x_{ciht-1})/2}$ in our basic specifications. This average measure of the growth rate of exports, used by Davis and Haltiwanger (1992), allows us to include observations of zero trade in our estimation sample. Specifically, this measure caps the growth rate of trade between $t-1$ and t at +200% when there is entry into a market and -200% when there is exit from a market. Including observations of China's entry (and exit) into specific markets allows to examine the extensive margin of China's trade, an important and interesting question for our empirical work which seeks to understand if China, as a developing country, is also able to deflect its exports to *new* markets when it faces trade restrictions that may be shutting it out of the U.S. or EU markets. Nevertheless, so as to check the robustnsess of our results, we also include specifications that use conventional log growth rate measures $\Delta x_{ciht} \equiv lnx_{ciht} - lnx_{ciht-1}$, omitting all observations on entry and exit by construction and thus focusing on the intensive margin of trade. Next, we use year dummies to control for aggregate shocks in China and country d, (Δa_{ct} and Δa_{dt}). The variable $\Delta\tau^{US}_{c,usht}$ ($\Delta\tau^{EU}_{c,euht}$) designates the magnitude of the contemporaneous change in the U.S. (EU) tariff

[15]Alternatively, if we assume that country i trade policy varies over time, but is MFN, or nondiscriminatory, we arrive at the same specification.

rate against imports from China. Similarly, the variable $\Delta\tau^{US}_{d,usht}$ ($\Delta\tau^{EU}_{d,euht}$) designates the magnitude of the contemporaneous change in the U.S. (EU) tariff rate against imports from country d.

When implementing the model on a sample of data, we choose India as 'country d' for a number of reasons. As we detail below, India has considerable similarities with China when it comes to export structure (both by commodity and by destination market), export growth during this time period, and it is also an important target of both U.S. and EU use of antidumping.[16]

The coefficients β_{1j} and β_{2j} for $j = t-2, t-1, t$ identify trade deflection associated with U.S. and EU antidumping duties. If the imposition of a U.S. antidumping duty against China is associated with an increase in China's exports relative to India's (country d's) exports, we expect that β_{1j} will be greater than zero. Similarly, if an increase in the U.S. antidumping duty against India induces Indian trade deflection, we expect India's exports to market i to rise relative to China's exports to i, yielding a positive coefficient on β_{1j}. The same reasoning implies that trade deflection associated with an EU antidumping measure will yield an estimate of β_{2j} that is positive.

Note, however, that one implication of this particular difference-in-difference approach is that we cannot identify β_{3j} and β_{4j} - i.e., trade depression - from equation (2). We therefore introduce a framework for estimating trade depression separately in the next section.

Finally, while equation (2) forms our baseline specification, as a robustness check we also estimate a variant of the model to examine the possibility of "aggregate deflection" by China and India (country d) to *all* markets other than the U.S. and EU. Specifically, in this particular sensitivity analysis we sum Chinese exports to China's top 41 trading partners (see again table 1) less the U.S., EU and India (country d) for each product in year t (x^{row}_{cht}). Similarly, in accordance with our difference-in-difference strategy, we sum India's (country d's) exports to those same 38 trading partners (China's top 41 less the U.S., EU, and India) for each product h in each year t (x^{row}_{dht}). We then estimate an aggregated analog to equation (2) given by

$$\begin{aligned}(\Delta x^{row}_{cht} - \Delta x^{row}_{dht}) = \Delta a_{ct} - \Delta a_{dt} + \sum_{j=t-2}^{t} \beta'_{1j}(\Delta\tau^{US}_{c,ushj} - \Delta\tau^{U.S.}_{d,ushj}) \\ + \sum_{j=t-2}^{t} \beta'_{2j}(\Delta\tau^{EU}_{c,euhj} - \Delta\tau^{EU}_{d,euhj}) + (\Delta\epsilon^{row}_{cht} - \Delta\epsilon^{row}_{dht}).\end{aligned} \tag{2'}$$

[16] While India did undertake a substantial unilateral trade liberalization episode during the 1991-1997 period, we do not include information on India's import tariff changes in the estimation. While changes to India's import tariff structure could feed through into changes into its exports, making this link would require a highly disaggregated input-output mapping that is beyond the scope of this paper. In unreported results we have introduced controls for India's own use of antidumping against China and the estimates we report below are unaffected.

We also expect that aggregate trade deflection associated with U.S. and EU duties will be associated with positive coefficient estimates of β_{1j} and β_{2j}.

2.4 Difference-in-difference model of trade depression

We use a similar difference-in-difference approach to estimate trade depression. To fix ideas once again, we are interested in the question of whether China's exports to a third country market fall if that country's own exports of a 6-digit HS product are subject to a U.S. or EU antidumping trade restriction. In order to obtain identification in this case, we utilize variation in China's exports to two different countries that faced U.S. and EU antidumping restrictions between 1992-2001.

Taking the time difference of (1) for two separate export markets, we write the difference between China's export growth to countries i and k as:

$$\begin{aligned}(\Delta x_{ciht} - \Delta x_{ckht}) = \Delta a_{it} - \Delta a_{kt} + \sum_{j=t-2}^{t} \beta'_{3j}(\Delta \tau^{US}_{i,ushj} - \Delta \tau^{US}_{k,ushj}) \\ + \sum_{j=t-2}^{t} \beta'_{4j}(\Delta \tau^{EU}_{i,euhj} - \Delta \tau^{EU}_{k,euhj}) + (\Delta \epsilon_{c,iht} - \Delta \epsilon_{ckht}),\end{aligned} \tag{3}$$

where variables are defined as in (2), and we use year dummies to control for aggregate variation in countries i and k. The coefficients β_{3j} and β_{4j} for $j = t-2, t-1, t$ identify potential trade depression associated with U.S. and EU trade policies. Trade depression, a decline in China's exports to countries i or k in the face of an antidumping measure, would imply estimates of β_{3j} and β_{4j} that are less than zero.

Note, finally, that there are two subtle differences between equations (3) and (2). First, with respect to Chinese exports to two different countries, even a China-specific 6-digit HS productivity shock falls out of the expression, so the restrictiveness of the assumption about time-varying productivity is less stringent in equation (2). Second, equation (3) implicitly assumes that tariff policies by countries i and k are constant over the time period under consideration. In order to estimate equation (3), we choose countries that infrequently changed their own tariffs over the sample period. For reasons we detail below, we estimate equation (3) on relative Chinese export growth to Japan (i) and Korea (k).

3 Variable Construction and Data

In this section we discuss the construction of variables used in the estimation. Tables 5 and 6 present summary statistics for the primary data used in the estimation.

3.1 Trade variables

The dependent variables in the estimation of equations (2), (2′), and (3) are constructed from the annual volume of China's exports to 38 of its top markets for roughly 4700 6-digit Harmonized System (HS) products for the years 1992 to 2001 (table 1). The data derives from the World Integrated Trade System (WITS) COMTRADE data base. The dependent variable of equation (2) also requires data on Indian (country d) exports of the same 4700 products to 38 of China's top markets. In our robustness checks, we also use data on the *value* of Chinese and Indian exports to these markets. Our final estimation sample includes observations on the dependent variable from 1993 to 2001.

First consider the dependent variable in the estimation of equation (2), the difference between the annual growth of China's exports to 38 different countries i of commodity h and India's exports of the same commodities to the same countries. In choosing India as 'country d' in equation (2) we were guided by a desire to match as closely as possible China's mix of export markets, its mix of exported goods, its relatively high aggregate growth rate of exports, and the relatively high number of antidumping measures imposed by the U.S. and EU between 1992-2001. Table 1 presents the shares of exports by economy for China and India in 1997, the midpoint of our sample. First, the U.S. and EU are important destination markets for both countries and represent a combined 31.0% (46.1%) of China's (India's) total exports. They share a number of other important export markets including Japan; South Korea; Singapore; Taiwan, China; Russia; Australia; Canada; and Malaysia. The biggest difference is that China's top export market is Hong Kong SAR, China, with a 24.0% export share; while it receives only 5.6% of India's exports. One likely explanation for this disparity was the role of entrepôt trade Hong Kong SAR, China played for exports originating in China (Feenstra and Hanson, 2004).[17] Finally, export shares are similar in other years, but they do reflect some changes in the structure of trade over time.

Table 7 presents two pieces of data: the shares of China's and India's exports by broadly-defined goods categories for 1997, and the shares of total U.S. and EU antidumping against China and India for each of the goods categories. First, much like the pattern of overall use of the policy found in other research, metals is the primary industrial target for antidumping use against Indian and Chinese exports. Overall, each of the 15 different goods categories for Chinese exporters is affected by some U.S. or EU antidumping, whereas antidumping against Indian exporters is more heavily concentrated in fewer industries (metals, textiles and apparel, plastics, chemicals). In terms of the

[17] In the formal estimation, we have run specifications of the model that drop Hong Kong SAR, China as an export market, and we have also examined whether re-exports of Chinese goods from Hong Kong SAR, China might account for trade deflection. None of our results were affected by these considerations, though the estimates are available from the authors upon request.

mix of exported goods, the top category for both countries is textiles and apparel, which account for 14.1% (17.5%) of China's (India's) exports. Metals including steel, are another important category of exports, representing 10.1% (11.8%) of China's (India's) exports. In terms of growth rates, average annual real growth of exports between 1993 and 2001 was 15.8% for China and 11.0% for India. In our product-level data set, which excludes exports by each country to the U.S., EU and China or India, average annual growth of the volume of exports (across all markets) was 16.2% for China and 11.9% for India. Given the similarities of trade structure by destination markets and by products, the similar high rates of trade growth, and the similar frequencies of antidumping investigations (that we discuss more in the next section), India is the best country to use as a control for China in such a difference-in-difference framework.

On the other hand, when we estimate equation (3), we define the dependent variable as the difference between Chinese export growth of product h in year t to Japan and Korea. We choose Japan and Korea as the export destinations i and k for the following reasons: (1) Japan and Korea are at similar stages of development with similar industrial structures, (2) the two countries have similar aggregate rates of import growth from China, and (3) both countries frequently face U.S. and EU antidumping measures during this time period with some overlap of products that China exports, making them potentially good targets for identifying trade depression.

While Japan and Korea were not required by WTO rules to report changes in trade policy, including antidumping, against China during the 1992-2001 period and, thus, any reporting may be incomplete, some information is available. Japan reported one antidumping case against China (initiated in 1991) and Korea reported eight investigations between 1992 and 2001. While the information reported may be incomplete, it is supportive of our assumption that Japan and Korea's trade policies against China did not involve using antidumping to enact high frequency tariff changes during this period.

3.2 U.S. and EU antidumping policy variables

The main explanatory variables of interest are the changes to U.S. and EU import policy facing a commodity h exported from China or from another country. Our estimates use the level of duties imposed by the U.S. and by the EU. For EU cases that result in price undertakings, we use reported dumping margins to proxy for the magnitude of the policy change.[18]

The information on U.S. and EU measures imposed at the product level derives from the Global Antidumping Database (Bown, 2010a). For the case of the U.S. (EU) antidumping, the information

[18] In unreported results, we have also separated antidumping cases that end in duties versus those that end in price undertakings, and this does not affect our results.

in the dataset has been collected from original source government publications such as the *Federal Register* (*Official Journal of the European Communities*), where we are able to track the dates of investigations, measures imposed, countries affected, and 6-digit HS products that were targeted.

Our estimation examines the export growth path for products targeted by an antidumping measure for multiple years around the policy's actual imposition. For both U.S. and EU antidumping measures examined in the estimation, we identify the focal year t as the *initiation* year of the antidumping investigation, as opposed to the year the final measure was actually imposed, though frequently they will be the same. One motivation for this choice is that there has been evidence in prior research that even antidumping investigations that do not end in imposed measures can have a destructive effect on imports, due to the uncertainty as to the final disposition of the case (Staiger and Wolak, 1994). Nevertheless, we expect that this decision could lead us to estimate a differential impact of Chinese export growth with respect to the timing of U.S. versus EU measures, and in some specifications we therefore allow for the lagged imposition of policies $(t-1, t-2)$ to affect contemporaneous export growth.

4 Empirical Results

4.1 Difference-in difference-estimates of trade deflection

Do U.S. and EU antidumping duties deflect Chinese and Indian exports to third (non-U.S., non-EU) markets? Our difference-in-difference deflection estimates, presented in table 8, indicate no robust evidence of statistically significant deflection. In fact, rather than an increase in exports to third markets, U.S. antidumping duties may be associated with a "chilling" effect of a decrease in Chinese export growth to such alternative markets. With respect to EU trade policy, the only economically and statistically significant finding is a chilling effect associated with EU duties on steel products.

Our baseline specification (1) examines the response of the difference between China's and India's yearly growth of the volume of trade to the *contemporaneous* initiation of an antidumping investigation that resulted in duties imposed by the U.S. and EU against China and/or India, respectively. At this short time horizon, the difference between the within-year policy changes against China and India has no effect on the difference in the growth of the volume of exports to alternative markets. Given that it could take over a year for a U.S. or EU antidumping investigation to result in the imposition of a definitive import restriction, the finding of no contemporaneous response in not entirely surprising. Our second specification (2) utilizes the same dependent variable, but includes lags of the difference in the change in the U.S. and EU duties, respectively. We include lags in case the full impact of a new antidumping restriction is not felt until the full administrative process (or perhaps even longer) is completed. Furthermore, the timing of the effect of U.S. versus EU policies could vary because of differences in their administrative structures, the likelihood that preliminary measures are imposed earlier on in the investigation, etc. In this specification, we find that at one lag, an increase in the U.S. duty against China (or India) is associated with a reduction in the growth rate of Chinese (or Indian) exports to third countries relative to the growth rate of Indian (or Chinese) exports. We interpret this as evidence of a potential chilling effect of the U.S. policy on Chinese exports to alternative markets. The joint F-test of the overall negative impact of the contemporaneous and lagged policy imposition indicates statistical significance at the 5% level in this specification. While the significance of this joint test of "chilling" is not robust across all specifications; nevertheless, what is striking is that there is *no* evidence of the anticipated, positive impact of trade deflection.

In terms of the magnitude of the estimates reported in specification (2), a 1% increase in the duty against China is associated with the difference in the mean export growth rates between China and India *narrowing* by 0.302 percentage points. In our sample, mean growth for Chinese exports over this period was 16.2% while mean growth for Indian exports was 11.9%. Thus, raising the duty against China by 1% is associated with a decline in the differential of the average growth rate of exports between the two countries from roughly 4.3% (=16.2% - 11.9%) to 4.0%. If the U.S. were to apply the conditional mean duty against China in the sample (125%), this would imply a 20 percentage point reduction in Chinese export growth relative to Indian export growth of the same product.

Proceding across specifications, in column (3) we redefine the dependent variable to be the difference in the growth rates of the *value* of exports and find that our estimates are qualitatively unchanged. A 1% increase in a U.S. antidumping duty against one country leads that country's export growth to be 0.3 percentage points lower in the year after initiation of the antidumping investigation that resulted in a duty. In column (4), we introduce 6-digit product fixed effects to the estimation and the basic result is unchanged. Column (5) replaces the Davis and Haltiwanger definition for the growth rate of exports (used in construction of the dependent variable) with the standard log growth rate measure. This measure, by construction, omits all observations in which China or India enters or exits a particular country's import market in a given year. While the statistical significance of the estimated impact is reduced because the identification is driven by variation across a smaller sample of observations, again we find an estimate of chilling associated with a U.S. antidumping duty at a lag of one year. This estimate on purely the intensive margin suggests our results are not sensitive to allowing for entry and exit.

Column (6) examines the effect of U.S. and EU antidumping duties on a subsample of steel products (HS chapters 72 and 73). Because the steel industry is an active user of antidumping trade restrictions, we might be concerned that the estimated effects are driven entirely by steel products. Nevertheless, our restricted steel sample indicates no statistically significant effect of U.S. antidumping duties, but there is evidence of a chilling effect associated with EU antidumping measures in the year after the antidumping investigation is initiated. For this subsample of products, the magnitude of the chilling effect of an EU antidumping duty is slightly larger - a 1 percent increase in the duty against one country is associated with the growth rate for the targeted country being 0.908 percentage points lower than that of the non-targeted country.[19]

Finally, in column (7) of table 8, we redefine our dependent variable to be the difference in the growth rate of China's and India's *aggregate* exports (to 38 markets) for each particular product, and we estimate equation ($2'$). Specifically, we aggregate the total value of exports of each 6-digit HS product (less exports to the U.S., EU and India or China) in each year for China and India and then calculate the Davis and Haltiwanger growth rate for each product aggregated across destination markets in each year. Relative to our other specifications in which each observation of product-level export growth to each market i carries equal weight, the aggregated growth specification is less likely to be influenced by outlier observations of very high or low growth coming from modest changes in trade volumes when the level of trade is low. Notably, the mean (and standard deviation) of growth aggregated across products for China and India are 9.3% (0.76) and 11.2% (1.15) respectively, which are considerably lower than the mean (and standard deviation) of export growth for China and India of 17.9% (1.27) and 11.9% (1.54), respectively, from our estimation sample for specification (3). In the aggregated growth specification we find a slightly stonger chilling effect; a 1 percent increase in the U.S. antidumping duty against China or India is associated with a growth rate for the targeted country that is 0.396 percentage points lower than the non-targeted country in the year following initiation of an investigation that resulted in a duty.

Thus, while there is no evidence of trade deflection, there is some evidence that U.S. and EU antidumping measures are associated with these targeted Chinese and Indian products *slowing down* their export growth to third markets. One explanation for the "chilling effect" result could be that it is self-imposed - i.e., that Chinese or Indian exporters recognize through the U.S. and EU policy that these products are in politically sensitive product categories. Therefore, in the hope that they might avoid such import restrictions in third markets as well, the exporters take it upon themselves to curtail their export growth. Nevertheless, this is only one interpretation, as we cannot rule out the possibility that this chilling effect is the result of the third market imposing its own import

[19] In unreported results available from the authors, we have confirmed that running a specification similar to (6) on non-steel products does *not* lead to a positive and significant estimate of trade deflection for EU antidumping imposed in $t-1$.

restrictions. We would only be able to address this distinction by having access to data that would fully control for any product-level changes in trade policy on Chinese imports into these other (i.e., non-U.S., non-EU) markets, a difficult endeavor given the lack of data *reporting* requirements vis-à-vis China during the pre-WTO accession period of the sample, as we described in the introduction. We do note, however, that alternative markets such as Japan and South Korea that did report use of antidumping to the WTO during this time period targeted China with antidumping actions in products that were different from those targeted by the U.S. and EU.

4.2 Difference-in-difference estimates of trade depression

While there is evidence of a "chilling" effect of U.S. and EU antidumping policies on Chinese exports to third markets, is there evidence that when the U.S. and EU impose such policies on third countries that there is also a *trade depressing* effect on Chinese exports? Table 9 presents our results on trade depression for Chinese exports to Japan and Korea in the face of those two countries being hit with U.S. and EU antidumping. We find strong evidence that the imposition of U.S. antidumping duties against Japan and Korea is associated with a large, economically and statistically significant decline in Chinese exports to Japan and Korea.

Beginning with column (8), our baseline specification uses the difference in the growth of the *volume* of Chinese exports to Japan and Korea as the dependent variable. We find that a 1% increase in the U.S. antidumping duty against Japan or Korea is associated with the growth of Chinese exports to the targeted country being roughly 1.5 percentage points lower than growth to the non-targeted country. In contrast we find no evidence of depression associated with EU AD duties. This economically large depression effect of U.S. antidumping is qualitatively similar across specifications using different dependent variables. Column (9) presents a similar result when we add lags of the change in the duty. Column (10) reports a somewhat larger effect when we redefine the dependent variable to be the difference in the *value* of export growth, and we then include product-level fixed effects in column (11). In column (12) we use a log growth measure in order to eliminate observations on entry and exit and focus on only the intensive margin. The contemporaneous effect of the depression result still exists, though it is moderated by relative export growth two years later for those obervations for which there was continuous export (no entry or exit). Lastly, column (13) restricts our sample steel products and finds that the magnitude of the coefficient is roughly equal to the coefficient in the sample of all products, suggesting that the effect in steel products is similar to that in non-steel products.

We estimate, but do not report, some additional specifications to help us understand and interpret the magnitude of our depression result. First, we observe that entry and, especially, exit by Chinese exporters from specific markets do not drive our results. To check our results from the log growth measure specification (12), we re-estimate specification (10) but drop all observations of Chinese export growth to Japan or Korea that have a value of +/- 2 (indicating entry and exit). For this specification, our estimate of the effect of the difference in a change in the U.S. duty on product h in year t increases slightly in absolute value relative to specification (9) to -2.02 (standard error=.818) from -1.98.

Second, we observe that depression is primarily driven by U.S. AD activity against Japan. A few statistics bring this into view. In our sample of 29474 observations, we have only 16 antidumping duties imposed by the U.S. against Korea, but 42 imposed against Japan.[20] Moreover, when we look at the mean growth rates of Chinese exports to Korea and Japan conditional upon a U.S. antidumping duty, we find that Chinese exports to Korea are higher while Chinese exports to Japan are substantially lower.

Third, we have performed a number of industry-specific regressions which indicate that depression is driven by a variety of products for which Japan faced antidumping duties over a number of years.

Fourth, because two products, ferro-silicon/silico-manganese (HS=720230) and temporary lighters (HS=961310) were subject to antidumping investigations in different years by Japan, Korea, the U.S. and EU, we re-estimated all of our depression specifications in the absence of observations on these products. Our estimates were identical to those reported in table 4 to one decimal place.[21]

Lastly, to better understand the magnitude of our depression coefficient, we calculate the mean change in the level of the value of Chinese exports to Japan, conditional on a U.S. antidumping duty being imposed. We find that Chinese exports to Japan fall by about U.S.$1 million when the U.S. imposes an antidumping duty on its imports from Japan. In our dataset, aggregate Chinese exports to Japan rise from roughly U.S.$15 billion in 1993 to U.S.$44 billion in 2001. Thus, our estimate of depression, while large and economically significant in the markets for some products, is small relative to the total value of Japanese imports from China.

[20]To clarify, although the U.S. imposed antidumping measures on roughly 95 (120) different 6-digit HS export products from Korea (Japan) during this time period, Korea (Japan) only imported 16 (42) of these same products from China.

[21]Japan reported initiating an antidumping investigation on imports of ferro-silicon (HS=720230) from China in 1991. The U.S. imposed an antidumping restriction on the same 6-digit product in 1993, the EU in 1996 and Korea in 1997. The EU restricted imports of temporary lighters (HS=961310) from China in 1990 and Korea restricted imports of the same product in 1997.

5 Robustness: IV estimates of trade deflection and trade depression

5.1 Panel data regression model

Given that our estimates of equations (2) and (3) could be sensitive to the choice of countries d (India), i (Japan), and k (Korea), we present a final check on the robustness of our results by examining an alternative model that relies more on cross-sectional variation across 6-digit products and countries to obtain identification. This has some similarities to the approach taken in Bown and Crowley (2007).[22] In this alternative approach, we start with the time difference of (1):

$$\begin{aligned}\Delta x_{ciht} = \Delta a_{ht} + \Delta a_{ct} + \sum_{j=t-2}^{t} \beta'_{1j}\Delta\tau^{US}_{c,ushj} + \sum_{j=t-2}^{t} \beta'_{2j}\Delta\tau^{EU}_{c,euhj} \\ + \sum_{j=t-2}^{t} \beta'_{3j}\Delta\tau^{US}_{i,ushj} + \sum_{j=t-2}^{t} \beta'_{4j}\Delta\tau^{EU}_{i,euhj} + \Delta\epsilon_{ciht},\end{aligned} \tag{4}$$

where we assume that country i's trade policy toward China is constant over the time period under investigation. Then, we use 6-digit product fixed effects and lagged export growth to proxy for time-varying cost or productivity shocks at the product level. Our estimating equation is then:

$$\begin{aligned}\Delta x_{ciht} = a_h + \Delta a_{ct} + \Delta a_{it} + \sum_{j=t-2}^{t} \beta'_{1j}\Delta\tau^{US}_{c,ushj} + \sum_{j=t-2}^{t} \beta'_{2j}\Delta\tau^{EU}_{c,euhj} \\ + \sum_{j=t-2}^{t} \beta'_{3j}\Delta\tau^{US}_{i,ushj} + \sum_{j=t-2}^{t} \beta'_{4j}\Delta\tau^{EU}_{i,euhj} + \beta'_5\Delta x_{ciht-1} + \Delta\epsilon_{ciht},\end{aligned} \tag{5}$$

where in estimating we apply the instumental variables techniques of Anderson and Hsiao (1981, 1982) because the autocorrelation of the dependent variable implies that least squares estimation

[22] Bown and Crowley (2007) estimate trade deflection and trade depression associated with U.S. antidumping against Japanese exports in a panel data model in which Japanese industry-level covariates proxy for technology and cost shocks. The analysis above, in contrast, uses the difference-in-difference equation (2) that does not require product-level controls to estimate trade deflection. This is useful because comparably disaggregated data to proxy for technology and costs shocks is not available for China during the sample. As a robustness check to the panel data model in Bown and Crowley (2007), they also estimated the Japanese sample on a similar model with product-level fixed effects and obtained consistent results, thus motivating our robustness check here. Nevertheless, a weakness with the IV approach is the lack of valid instruments. In the approach we adopt below, the second lag of of the log level of imports has strong predictive power for the lagged growth rate of imports. Nevertheless, a potential argument against using this instrument is that it requires the exclusion restriction that the second lag of the log level of imports has no direct effect on the current growth rate of imports

yields biased estimates.[23] In the estimation, we instrument for the lagged growth rate, Δx_{ciht-1}, with the second lag of the log level of exports, $ln(x_{ciht-2})$ if $x_{ciht-2} > 1$ and a value of zero if the second lag of the level of exports is less than 1.[24]

By utilizing 6-digit HS product fixed effects in (5) we control for changes in production costs or technology that imply that a particular good h will have a growth rate for exports that is higher or lower than average. Note that commodities with very high average growth rates also tend to be those most likely to be targeted for antidumping measures. As in equations (2) and (3) we use year dummies to control for all aggregate variation in China and country i over time.

For estimating equation (5), we calculate annual export growth of China's exports to 38 different countries i listed in table 1, excluding the U.S., EU and India.

5.2 Instrumental variables estimates of trade deflection and trade depression

Table 10 presents our estimates of trade deflection and trade depression from a panel of Chinese exports to 38 countries. Our finding of a chilling effect of U.S. antidumping duties from the difference-in-difference equation (2) discussed in section 4.1 appears to be robust across models. Although we find no evidence of chilling in specification (14) which regresses the growth of the volume of Chinese trade on only the *contemporaneous* initiation of antidumping cases that resulted in changes in U.S. and EU antidumping duties, when we include two lags of each change in a duty in specification (15), we find that a 1% increase in the U.S. antidumping duty against Chinese exports is associated with a 0.127% reduction in the growth of exports in the following year. For the conditional mean U.S. antidumping duty on China's exports in the sample of 125%, this implies a 15.9 percentage point fall in the growth of Chinese exports to an alternative market. When we redefine the dependent variable to be the *value* of exports (16), we estimate a chilling effect that is similar in magnitude but which is not statistically significant at standard confidence levels. Part of the explanation for this result is the additional observations added to the sample when we switch to values from volumes, as the COMTRADE data reports many observations for Chinese export values that do not include a volume counterpart.

[23] An alternative approach such as the Arellano and Bond (1991) GMM estimator which utilizes multiple lags of the level of the dependent variable as an instrument for the lagged growth rate is not computationally feasible in our estimation because of the large number of parameters in (5).

[24] Because the bias associated with using a weak instrument may be large, we test the quality of our instrument. First-stage restricted and unrestricted regressions are reported in table A-1 for our baseline specification. For all specifications, the F-statistics of roughly 312,000 are far larger than the 99% critical $\chi^2(1)$ of 6.63. We conclude that the second lag of the log level of exports is a strong instrument for the lagged growth rate.

In specification (17), we redefine the dependent variable to be the log growth of the value of exports, and in (18) we redefine it to be the Davis-Haltiwanger growth of the value of exports aggregated across the 38 markets in our sample. Both specifications also yield chilling estimates at one lag, a 1% duty implies roughly a 0.10 and 0.15% reduction in export growth, respectively. The last specification, (19), restricts the sample to steel exports and finds evidence consistent with our difference-in-difference estimates of table 8, i.e., there is no statistically significant evidence of deflection or chilling associated with U.S. imposition of antidumping on Chinese steel.

The next set of estimates in table 10 suggest evidence of a contemporaneous chilling effect of an EU antidumping duty against imports from China on Chinese exports to third countries. This differs slightly from our difference-in-difference estimates presented in table 8 which found no statistically significant relationship between EU antidumping and Chinese exports to third countries. Across the 6 specifications in table 10, estimates of the magnitude of the effect range from a low of a 0.17% fall in the growth of the value of Chinese exports to a high of a 0.52% fall in the value of Chinese exports of steel products when the EU increases its duty by 1%. For the regression on steel products (column 19), although the timing is slightly different, the relative size of the result vis-à-vis the estimate on the full sample of products is in line with the estimates from our difference-in-difference model.

In order to understand the differences between the results of our difference-in-difference model and our IV panel model, we can also examine the sources of variation in the data that identify the deflection/chilling effect for EU antidumping duties. In the difference-in-difference model of trade deflection, identification comes from variation between Chinese and Indian growth rates within a product. However, EU antidumping measures are highly correlated across China and India, especially for steel. The correlation between EU antidumping measures for China and India is 0.31 in our sample compared to only 0.26 for the U.S. Moreover, the correlation for EU measures is higher (0.66) when we limit our sample to steel products compared to a correlation of 0.47 for the U.S. Thus, identification of the effect of EU antidumping duties is relatively weak in the difference-in-difference model. However, there is some evidence of chilling in the IV panel estimates because identification in that model comes from (a) time variation in the growth rate within a product exported by China and (b) cross sectional variation across products exported by China.

Next consider the third panel of table 10 which presents our estimates of *trade depression* associated with U.S. antidumping duties against China. In contrast to our results from the difference-in-difference model, there is no robust evidence of trade depression associated with U.S. antidumping duties from our IV estimates on a panel of 38 of China's trading partners. While the estimated coefficient on the contemporaneous effect is frequently negative, it is not statistically significant.

The lowest panel of estimates in table 10 presents coefficient estimates of potential trade depression arising from EU antidumping duties. As with the U.S. estimates, there is no robust evidence of trade depression associated with EU antidumping duties. For two specifications, the log growth measure (column 17) and steel products (column 19), there is one statistically significant coefficient estimate that indicates trade depression. However, as these results are not robust to slight changes in the specification.

A simple explanation for the lack of trade depression in the IV panel model can be found by re-estimating the specification in column (15) on a restricted sample of Chinese exports to Japan and Korea only. In this smaller sample we do observe contemporaneous trade depression, consistent with our difference-in-difference estimates reported in table 9. This suggests that Japan and Korea are unusual among China's export partners and that the phenonomenon of trade depression is likely limited to the few countries that face very high antidumping duties emanating from the U.S. and EU.

5.3 Puzzles and Potential Explanations

A number of potentially complementary explanations are consistent with our results that Chinese exporters did not deflect trade during the 1992-2001 period. First, it could be that the Chinese products hit with U.S. and EU antidumping measures are primarily the function of export platform activity that can easily be disassembled and relocated to another country. It could also be that some of the products are highly differentiated with specifications designed (by U.S. or EU retailers) for one particular export market. Or it could be that these other WTO members were applying higher (non-MFN) tariffs against China during its pre-accession period that China was not able to penetrate. Finally, it could relate to the fact that as a "new" entrant into the global economy, Chinese firms did not yet have the networks over the 1992-2001 period to deflect trade to alternate markets, perhaps not yet having paid the market-specific fixed cost of entry.

Regardless of the explanation, our result of "missing" trade deflection is puzzling given that there was such concern about the phenomenon among the WTO membership that China's terms of accession include a safeguard to pre-emptively control it.

6 Conclusion

China's accession to the World Trade Organization (WTO) introduced a new China safeguard that allowed existing members to substantially deviate from the WTO's core principles of *reciprocity* and *most-favored-nation* (MFN) treatment based on the threat of trade deflection. This paper uses a new data set to construct measures of product-level, discriminatory trade policy actions that two of China's most important trading partners imposed on its exports during the 1992-2001 period. We find no systematic evidence that either U.S. or EU imposition of discriminatory import restrictions during this period deflected Chinese exports to alternative destinations. To the contrary, we provide some evidence that EU and U.S. trade restrictions may have a chilling effect on China's exports to third markets - i.e., the application of the mean U.S. duty is associated with a 20 percentage point reduction in the relative growth of targeted Chinese (vis-à-vis untargeted Indian) exports of the same product.

Our results do raise a number of policy concerns. One derives from a comparison of the results in this paper and the empirical evidence of trade deflection from studies of developed countries (e.g., Bown and Crowley, 2007). Developing country exporters may face an additional cost to antidumping if they are unable to deflect trade and recoup some of their losses.[25] This could suggest that the failure to reform antidumping in the Doha Round is even more detrimental to developing countries than had previously been considered.

The lack of historical evidence of Chinese trade deflection presents a potential additional concern raised by the terms of China's WTO accession. Given the theoretical insights of Bagwell and Staiger (2002) regarding the importance of the reciprocity and MFN rules to the sustainability of the efficiency-enhancing features of the WTO, the easy-to-access, new China safeguard remains a threat to the WTO. The China safeguard policy itself may pose a bigger threat to the world trading system than the trade deflection it was partially designed to control.

[25]For example, we found China did not deflect steel exports whereas Japan did deflect steel exports in the face of U.S. antidumping measures. Thus, the lack of trade deflection by developing countries is not simply a product-level phenomenon determined solely by the differences in the countries' export baskets.

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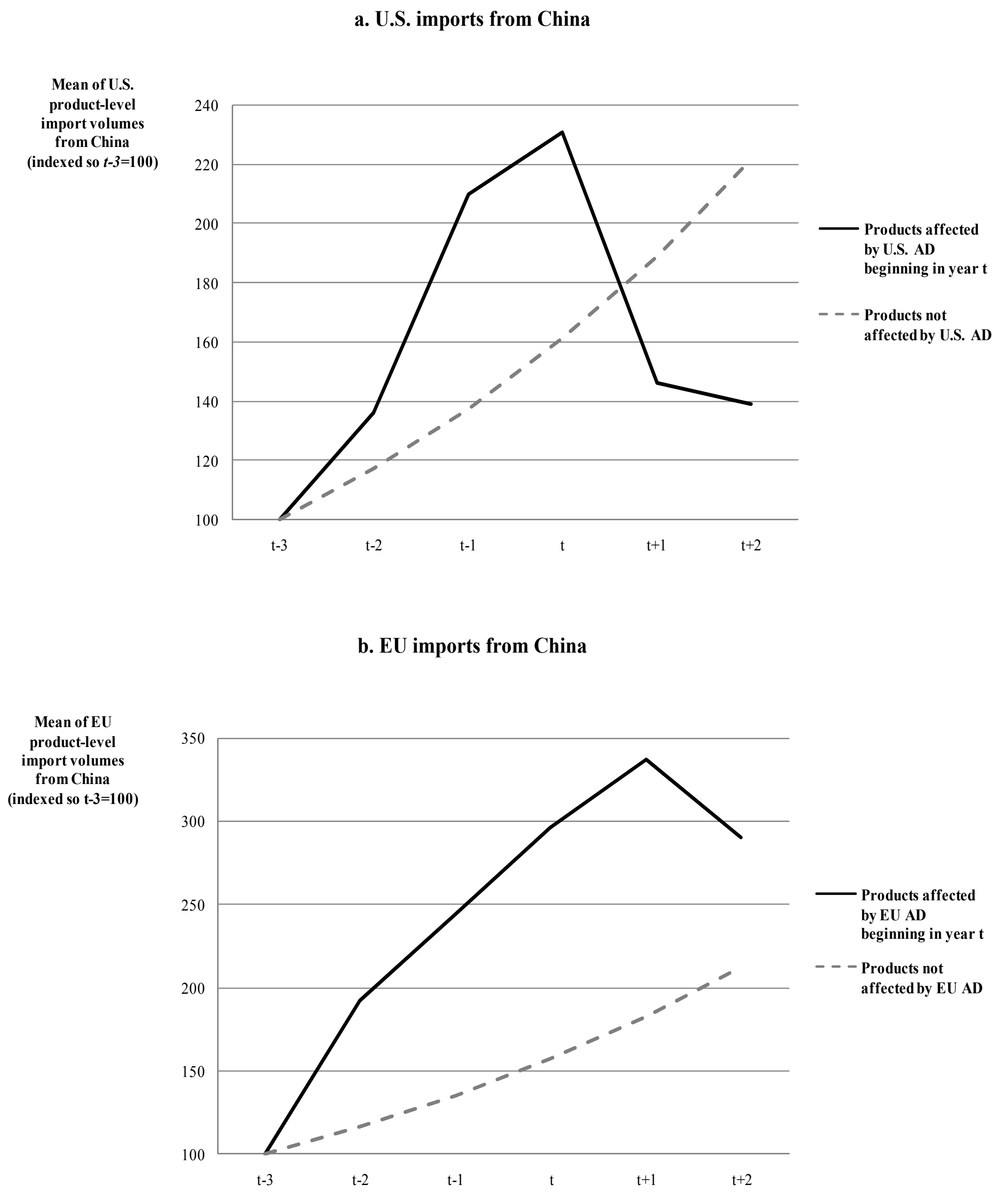
Figure 1: Trade Destruction Associated with U.S. and EU Antidumping on Imports from China, 1990-2001



Notes: year *t* is the beginning of the antidumping investigation. Products defined at the 6-digit HS level with import data from Comtrade. Antidumping data is taken from Bown (2010a).

Table 1: China's and India's Major Export Markets, 1997

Rank	Export Market	Share of China's Total Exports, 1997	Share of India's Total Exports, 1997
1	Hong Kong SAR, China	0.240	0.056
2	United States	0.179	0.196
3	Japan	0.174	0.055
4	European Union	0.131	0.265
5	South Korea	0.050	0.014
6	Singapore	0.024	0.022
7	Taiwan, China	0.019	0.011
8	Russia	0.011	0.028
9	Malaysia	0.011	0.014
10	Australia	0.011	0.013
11	Canada	0.010	0.012
12	Indonesia	0.010	0.013
13	Thailand	0.008	0.001
14	Philippines	0.007	0.007
15	United Arab Emirates	0.007	0.047
16	Vietnam	0.006	0.004
17	Brazil	0.006	0.004
18	Panama	0.006	0.001
19	India	0.005	-
20	Saudi Arabia	0.005	0.020
21	South Africa	0.004	0.012
22	Bangladesh	0.004	0.023
23	Poland	0.004	0.003
24	Pakistan	0.004	0.004
25	Macau	0.004	0.000
26	Switzerland	0.003	0.010
27	Myanmar	0.003	0.001
28	Norway	0.003	0.002
29	Chile	0.003	0.004
30	Turkey	0.003	0.007
31	North Korea	0.003	0.001
32	Iran	0.003	0.005
33	Argentina	0.003	0.003
34	Egypt	0.003	0.007
35	Mexico	0.002	0.003
36	Nigeria	0.002	0.006
37	Hungary	0.002	0.001
38	New Zealand	0.002	0.002
39	Israel	0.001	0.000
40	Czech Republic	0.001	0.001
41	Kazakhastan	0.001	0.000
	China	-	0.021

Source: compiled by the authors from COMTRADE.

Table 2: U.S. and EU Use of Antidumping Measures, 1992-2001

a. U.S. antidumping

	Export target	Antidumping investigations (share of total)		Investigations resulting in measures (share of target's investigations)		Only economy named in investigation (share of target's investigations)		Mean margin (%), cond'l on measures imposed	Share of U.S. import market 1995-2001, (rank)	
1	China	55	(0.14)	35	(0.64)	26	(0.47)	137.27	0.08	(5)
2	EU	47	(0.12)	20	(0.43)	10	(0.21)	29.24	0.19	(2)
3	Japan	38	(0.10)	21	(0.55)	11	(0.29)	63.11	0.13	(3)
4	South Korea	32	(0.08)	15	(0.47)	3	(0.09)	15.36	0.03	(7)
5	Taiwan, China	23	(0.06)	13	(0.57)	3	(0.13)	19.72	0.03	(6)
6	Mexico	21	(0.05)	7	(0.33)	4	(0.19)	43.60	0.10	(4)
7	Brazil	18	(0.05)	9	(0.50)	1	(0.06)	63.35	0.01	(12)
8	Canada	18	(0.05)	5	(0.28)	6	(0.33)	22.38	0.19	(1)
9	India	16	(0.04)	9	(0.56)	2	(0.13)	50.37	0.01	(19)
10	South Africa	12	(0.03)	5	(0.42)	1	(0.08)	42.95	0.00	(26)
	All other	116	(0.29)	50	(0.43)	12	(0.10)	73.50	0.22	
	Total	396	(1.00)	189	(0.48)	79	(0.20)	66.31	1.00	

b. EU antidumping

	Export target	Antidumping investigations (share of total)		Investigations resulting in measures (share of target's investigations)		Only economy named in investigation (share of target's investigations)		Mean margin (%), cond'l on measures imposed	Share of EU import market 1995-2001, (rank)	
1	China	53	(0.15)	23	(0.43)	27	(0.51)	76.93	0.06	(4)
2	India	28	(0.08)	15	(0.54)	6	(0.21)	80.85	0.01	(20)
3	South Korea	26	(0.07)	13	(0.50)	7	(0.27)	24.58	0.02	(9)
4	Thailand	22	(0.06)	13	(0.59)	1	(0.05)	41.87	0.01	(21)
5	Russia	19	(0.05)	10	(0.53)	3	(0.16)	99.81	0.03	(6)
6	Taiwan, China	16	(0.04)	8	(0.50)	6	(0.38)	28.11	0.03	(7)
7	Malaysia	15	(0.04)	9	(0.60)	1	(0.07)	34.52	0.02	(18)
8	Ukraine	14	(0.04)	7	(0.50)	0	(0.00)	132.43	0.00	(50)
9	Indonesia	13	(0.04)	7	(0.54)	0	(0.00)	60.77	0.01	(23)
10	Turkey	13	(0.04)	3	(0.23)	3	(0.23)	32.63	0.02	(13)
	All other	138	(0.39)	67	(0.49)	20	(0.14)	58.85	0.78	
	Total	357	(1.00)	175	(0.49)	74	(0.21)	60.04	1.00	

Note: Antidumping data compiled by the authors from Bown (2010a). Import data from COMTRADE. †EU import data is extra-EU imports only.

Table 3: U.S. and EU Antidumping Against China's and India's Export Products, 1990-2001

	Number of unique† 6-digit HS product codes
Exports from China facing U.S. antidumping measures	77
Exports from China facing EU antidumping measures	60
Exports from China facing both U.S. and EU antidumping measures	14
Exports from India facing U.S. antidumping measures	36
Exports from India facing EU antidumping measures	32
Exports from India facing both U.S. and EU antidumping measures	8

Notes: data compiled by the authors based on Bown (2010a). † 'Unique' relates to the fact that some 6-digit HS products may have been investigated or hit with an antidumping measure more than once during the 12 year sample.

Table 4: China's Export Products Targeted by Both U.S. and EU Antidumping, 1990-2001

Product† (HS 1992 codes)	Year of EU AD Measure Against China	Year of U.S. AD Measure Against China
Foundry Coke (270400)	1999	2000
Persulfates (283340)	1994	1996
Sulfanilic Acid (292142)	2001	1991
Coumarin (293221)	1994	1994
Ferrosilicon (720221, 720229)	1992	1992
Silicomanganese (720230)	1996	1993
Steel Plate (720842, 720843)	1999	1996
Iron Waterworks Fittings (730719)	1999	1992
Carbon Steel Pipe Fittings (730793)	1994	1991
Lug Nuts (731816)	1996	1990
Pure Magnesium (810411, 810419)	1997	2000

Notes: data compiled by the authors based on Bown (2010a). † Production description based on that listed in the U.S. antidumping investigation.

Table 5: Data Summary Statistics for Difference-in-Difference Approach to Trade Deflection

Difference-in-Difference Model of Deflection	**Sample Size**	**Mean**	**Standard Deviation**
<u>Dependent Variables</u>			
Difference in volume of export growth of product *h*	**227555**	**0.0431**	**1.9788**
Yearly growth of the volume of China's exports of product *h*	227555	0.1621	1.2355
Yearly growth of the volume of India's exports of product *h*	227555	0.1190	1.5700
Difference in value of export growth of product *h*	**259595**	**0.0602**	**1.9812**
Yearly growth of the value of China's exports of product *h*	259595	0.1797	1.2690
Yearly growth of the value of India's exports of product *h*	259595	0.1195	1.5471
Difference in value of export growth of product *h* to ROW	**37378**	**-0.0192**	**1.3695**
Yearly growth of the value of China's exports of product *h* to ROW	37378	0.0932	0.7600
Yearly growth of the value of India's exports of product *h* to ROW	37378	0.1124	1.1565
<u>Explanatory Variables</u>			
U.S. AD duty against China less U.S. AD duty against India	**227555**	**0.0012**	**0.0361**
U.S. AD duty against China conditional on a duty (%)	429	125.12	80.51
U.S. AD duty against India conditional on a duty (%)	156	41.44	35.00
EU AD duty against China less EU AD duty against India	**227555**	**0.0002**	**0.0272**
EU AD duty against China conditional on a duty (%)	392	67.06	38.11
EU AD duty against India conditional on a duty (%)	319	65.64	66.48
U.S. AD duty against China less U.S. AD duty against India	**259595**	**0.0011**	**0.0346**
U.S. AD duty against China conditional on a duty (%)	459	123.28	80.22
U.S. AD duty against India conditional on a duty (%)	156	41.43	34.62
EU AD duty against China less EU AD duty against India	**259595**	**0.0002**	**0.0265**
EU AD duty against China conditional on a duty (%)	411	67.46	38.51
EU AD duty against India conditional on a duty (%)	319	65.58	67.18
U.S. AD duty against China less U.S. AD duty against India	**37378**	**0.0010**	**0.0351**
U.S. AD duty against China conditional on a duty (%)	57	141.44	88.41
U.S. AD duty against India conditional on a duty (%)	25	44.75	33.49
EU AD duty against China less EU AD duty against India	**37378**	**0.0002**	**0.0178**
EU AD duty against China conditional on a duty (%)	37	57.04	33.05
EU AD duty against India conditional on a duty (%)	19	63.55	65.25

Table 6: Data Summary Statistics for Difference-in-Difference Approach to Trade Depression

Difference-in-Difference Model of Depression	**Sample Size**	**Mean**	**Standard Deviation**
Dependent Variables			
Difference in volume of export growth of product *h*	**25975**	**-0.0763**	**1.4853**
Yearly growth of the volume of China's exports to Japan	25975	0.1439	1.0256
Yearly growth of the volume of China's exports to Korea	25975	0.2202	1.2432
Difference in value of export growth of product *h*	**29474**	**-0.0686**	**1.5173**
Yearly growth of the value of China's exports to Japan	29474	0.1744	1.0121
Yearly growth of the value of India's exports of product *h*	29474	0.2430	1.2628
Explanatory Variables			
U.S. AD duty against Japan less U.S. AD duty against Korea	**25975**	**0.0004**	**0.0121**
U.S. AD duty against Japan conditional on a duty (%)	39	35.82	24.99
U.S. AD duty against Korea conditional on a duty (%)	15	16.36	14.31
EU AD duty against Japan less EU AD duty against Korea	**25975**	**0.0001**	**0.0124**
EU AD duty against Japan conditional on a duty (%)	9	81.44	29.37
EU AD duty against Korea conditional on a duty (%)	11	36.09	26.46
U.S. AD duty against Japan less U.S. AD duty against Korea	**29474**	**0.0004**	**0.0127**
U.S. AD duty against Japan conditional on a duty (%)	42	38.29	26.22
U.S. AD duty against Korea conditional on a duty (%)	16	16.77	13.92
EU AD duty against Japan less EU AD duty against Korea	**29474**	**0.0001**	**0.0116**
EU AD duty against Japan conditional on a duty (%)	9	81.44	29.37
EU AD duty against Korea conditional on a duty (%)	12	34.20	26.06

Table 7: China's and India's Major Export Products and the Share of Antidumping Targeting those Products

Harmonized System Chapters	Description	Share of China's Total Exports in 1997	Share of Total U.S. and EU AD Targeting China†	Share of India's Total Exports in 1997	Share of Total U.S. and EU AD Targeting India†
01-05	Animal and Animal Products	0.000	0.028	0.000	0.000
06-15	Vegetable Products	0.000	0.028	0.000	0.013
16-24	Foodstuffs	0.137	0.055	0.076	0.013
25-27	Mineral Products	0.027	0.097	0.018	0.000
28-38	Chemicals & Allied Industries	0.157	0.159	0.157	0.053
39-40	Plastics / Rubber	0.035	0.014	0.039	0.067
41-43	Leather	0.013	0.014	0.006	0.000
44-49	Wood & Wood Products	0.069	0.021	0.042	0.000
50-63	Textiles & Apparel	0.141	0.028	0.175	0.173
64-67	Footwear / Headgear	0.004	0.021	0.011	0.000
68-71	Stone / Glass	0.047	0.007	0.040	0.000
72-83	Metals	0.101	0.433	0.118	0.667
84-85	Machinery / Electrical	0.170	0.048	0.202	0.013
86-89	Transportation	0.027	0.014	0.022	0.000
90-97	Miscellaneous	0.065	0.035	0.089	0.000

Source: compiled by the authors from COMTRADE and Bown (2010a). †Measured as the share of the exporter's total number of 6-digit HS tariff lines subject to U.S. and EU antidumping between 1990 and 2001.

Table 8: Difference-In-Difference Approach to Trade Deflection: The Impact of U.S. and EU Antidumping on China's Export Growth Relative to India's Export Growth, 1992-2001

	Dependent Variable: Yearly growth† of China's exports of product *h* to country *i* less yearly growth of India's exports of product *h* to country *i*						
Explanatory Variables	Export quantities (1)	Add lagged policy changes (2)	Export values (3)	Add 6-digit product fixed effects (4)	Log growth measure (5)	Steel products only (6)	Aggregated exports to ROW (7)
U.S. AD duty against China less U.S. AD duty against India							
Duty imposed on product *h* in year *t*	-0.033	-0.023	-0.052	-0.049	0.054	-0.311	0.044
	(0.115)	(0.115)	(0.106)	(0.116)	(0.158)	(0.241)	(0.190)
Duty imposed on product *h* in year *t-1*		-0.302***	-0.297***	-0.249**	-0.270*	-0.096	-0.396**
		(0.109)	(0.103)	(0.113)	(0.156)	(0.218)	(0.189)
Duty imposed on product *h* in year *t-2*		0.080	-0.020	-0.026	-0.005	0.043	-0.104
		(0.116)	(0.112)	(0.121)	(0.166)	(0.204)	(0.210)
EU AD duty against China less EU AD duty against India							
Duty imposed on product *h* in year *t*	0.137	0.138	0.104	0.004	0.132	-0.362	0.514
	(0.152)	(0.152)	(0.143)	(0.155)	(0.198)	(0.446)	(0.415)
Duty imposed on product *h* in year *t-1*		-0.056	0.058	-0.028	0.131	-0.908**	0.539
		(0.147)	(0.140)	(0.152)	(0.191)	(0.427)	(0.376)
Duty imposed on product *h* in year *t-2*		0.117	0.104	0.080	0.255	-0.030	-0.166
		(0.146)	(0.140)	(0.152)	(0.182)	(0.404)	(0.369)
Other Controls							
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product *h* fixed effects	No	No	No	Yes	No	No	No
Observations	227555	227462	270960	270960	110691	13430	40774
R^2	0.003	0.003	0.002	0.019	0.002	0.003	0.003

Notes: † Subscript *h* is a 6-digit HS product, and *t* is a year. With the exception of specification (5), the growth rate is defined using the Davis and Haltiwanger (1992) measure described in the text and is thus bounded between -2 (exit) and 2 (entry). In parentheses are standard errors, with ***, **, and * denote variables statistically significant at the 1, 5, and 10 percent levels, respectively.

Table 9: Difference-In-Difference Approach to Trade Depression: The Impact of U.S. and EU Antidumping on China's Export Growth to Japan Relative to Korea, 1992-2001

	Dependent Variable: Yearly growth† of China's exports of product *h* to Japan less yearly growth of China's exports of product *h* to Korea					
Explanatory Variables	Export quantities (8)	Add lagged policy changes (9)	Export values (10)	Add 6-digit product fixed effects (11)	Log growth measure (12)	Steel products only (13)
U.S. AD duty against Japan less U.S. AD duty against Korea						
Duty imposed on product *h* in year *t*	-1.480*	-1.627**	-1.979***	-1.853**	-3.499***	-1.999**
	(0.756)	(0.778)	(0.693)	(0.809)	(1.255)	(0.926)
Duty imposed on product *h* in year *t-1*		0.990	0.823	1.133	0.403	1.243
		(0.685)	(0.630)	(0.743)	(0.891)	(0.854)
Duty imposed on product *h* in year *t-2*		0.563	0.531	0.790	2.187**	-0.663
		(0.626)	(0.599)	(0.716)	(0.875)	(0.825)
EU AD duty against Japan less EU AD duty against Korea						
Duty imposed on product *h* in year *t*	0.033	0.035	0.261	0.057	-0.247	-0.027
	(0.741)	(0.741)	(0.755)	(0.862)	(0.883)	(1.546)
Duty imposed on product *h* in year *t-1*		-0.261	-0.027	-0.473	-0.946	3.332
		(0.837)	(0.772)	(0.930)	(0.984)	(2.778)
Duty imposed on product *h* in year *t-2*		0.213	-0.062	-0.550	1.495*	-2.525
		(0.771)	(0.719)	(0.857)	(0.879)	(2.781)
Other Controls						
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Product *h* fixed effects	No	No	No	Yes	No	No
Observations	25975	25966	29474	29474	21123	1483
R^2	0.013	0.013	0.013	0.111	0.012	0.050

Notes: † Subscript *h* is a 6-digit HS product, and *t* is a year. With the exception of specification (12), the growth rate is defined using the Davis and Haltiwanger (1992) measure described in the text and is thus bounded between -2 (exit) and 2 (entry). In parentheses are standard errors, with ***, **, and * denote variables statistically significant at the 1, 5, and 10 percent levels, respectively.

Table 10: IV Approach and Panel Estimates: The Impact of U.S. and EU Antidumping Measures on China's Exports to Third Markets, 1992-2001

	Dependent Variable: Yearly growth† of China's exports of product *h* to country *i*					
Explanatory Variables	Export quantities (14)	Add lagged policy changes (15)	Export values (16)	Log growth measure (17)	Aggregated exports to ROW (18)	Steel products only (19)
U.S. AD duty against China [Trade Deflection]						
Duty imposed on product *h* in year *t*	0.027 (0.055)	0.005 (0.056)	-0.012 (0.060)	-0.029 (0.068)	-0.030 (0.107)	0.216 (0.136)
Duty imposed on product *h* in year *t-1*		-0.127*** (0.045)	-0.073 (0.051)	-0.102* (0.053)	-0.154* (0.091)	-0.133 (0.124)
Duty imposed on product *h* in year *t-2*		-0.017 (0.046)	-0.029 (0.047)	0.117** (0.055)	-0.102 (0.100)	-0.112 (0.095)
EU AD duty against China [Trade Deflection]						
Duty imposed on product *h* in year *t*	-0.229** (0.093)	-0.257*** (0.095)	-0.169* (0.097)	-0.176* (0.094)	-0.311** (0.145)	-0.515*** (0.177)
Duty imposed on product *h* in year *t-1*		-0.075 (0.086)	0.007 (0.085)	0.067 (0.089)	0.114 (0.133)	-0.093 (0.116)
Duty imposed on product *h* in year *t-2*		-0.060 (0.095)	-0.045 (0.100)	0.002 (0.108)	-0.115 (0.179)	-0.153 (0.153)
U.S. AD duty against country *i* [Trade Depression]						
Duty imposed on product *h* in year *t*	-0.309 (0.505)	-0.334 (0.502)	0.052 (0.478)	-0.976 (0.800)	-0.020 (0.095)	0.049 (0.641)
Duty imposed on product *h* in year *t-1*		0.914** (0.386)	0.609 (0.376)	0.262 (0.572)	0.014 (0.092)	0.353 (0.508)
Duty imposed on product *h* in year *t-2*		0.546 (0.360)	0.491 (0.309)	-0.139 (0.423)	0.100 (0.082)	0.249 (0.419)
EU AD duty against country *i* [Trade Depression]						
Duty imposed on product *h* in year *t*	-0.036 (0.272)	-0.038 (0.271)	0.129 (0.341)	0.094 (0.235)	-0.046 (0.085)	0.047 (0.261)
Duty imposed on product *h* in year *t-1*		-0.498 (0.332)	-0.226 (0.326)	-0.646** (0.329)	0.018 (0.079)	-0.490 (0.49)
Duty imposed on product *h* in year *t-2*		-0.334 (0.301)	0.102 (0.378)	0.511 (0.442)	-0.049 (0.078)	-1.369** (0.599)
Other Controls						
Instruments for growth of China's exports of *h* to country *i* in *t-1*	Yes	Yes	Yes	Yes	Yes	Yes
Product *h* fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	478931	478851	563430	355555	38282	28762
R^2	0.09	0.09	0.09	0.04	0.12	0.10

Notes: † Subscript *h* is a 6-digit HS product, and *t* is a year. With the exception of specification (17), the growth rate is defined using the Davis and Haltiwanger (1992) measure described in the text and is thus bounded between -2 (exit) and 2 (entry). In parentheses are White's heteroskedasticity-consistent standard errors corrected for clusters defined on the variable defined as the 6-digit HS product and year combination. ***, **, and * denote variables statistically significant at the 1, 5, and 10 percent levels, respectively.

Table A-1: Testing Instrument Quality: First Stage Regressions

	Dependent Variable: Yearly growth† of China's exports of product *h* to country *i* in *t-1*	
Explanatory Variables	Unrestricted first stage regression (15)	Restricted first stage regression (15)
U.S. AD duty against China		
Duty imposed on product *h* in year *t*	0.049 (0.039)	0.088 (0.065)
Duty imposed on product *h* in year *t-1*	0.022 (0.050)	0.006 (0.071)
Duty imposed on product *h* in year *t-2*	-0.113*** (0.038)	-0.174*** (0.058)
EU AD duty against China		
Duty imposed on product *h* in year *t*	0.009 (0.085)	0.005 (0.114)
Duty imposed on product *h* in year *t-1*	-0.131* (0.077)	-0.181** (0.090)
Duty imposed on product *h* in year *t-2*	-0.005 (0.068)	-0.005 (0.088)
U.S. AD duty against country *i*		
Duty imposed on product *h* in year *t*	0.243 (0.361)	-0.548 (0.509)
Duty imposed on product *h* in year *t-1*	0.379 (0.315)	0.184 (0.442)
Duty imposed on product *h* in year *t-2*	0.685** (0.291)	0.672* (0.355)
EU AD duty against country *i*		
Duty imposed on product *h* in year *t*	0.376 (0.297)	0.265 (0.313)
Duty imposed on product *h* in year *t-1*	0.433 (0.287)	0.152 (0.309)
Duty imposed on product *h* in year *t-2*	-0.305 (0.275)	-0.672* (0.398)
Other Controls		
Second lag of the log level of China's exports of *h* to country *i*	-0.131*** (0.000)	--
Product *h* fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	534768	534768
R^2	0.39	0.03

Notes: † Subscript *h* is a 6-digit HS product, and *t* is a year, the growth rate is defined using the Davis and Haltiwanger (1992) measure described in the text and is thus bounded between -2 (exit) and 2 (entry). In parentheses are White's heteroskedasticity-consistent standard errors corrected for clusters defined on the variable defined as the 6-digit HS product and year combination. ***, **, and * denote variables statistically significant at the 1, 5, and 10 percent levels, respectively.